Landmarks in Civil Engineering

Robie Lange

As part of an initiative to prepare a National Historic Landmarks (NHL) theme study on Technology: Engineering and Invention, the History Division of the National Park Service has begun to examine properties which possess national significance in the field of civil engineering. Much like the ongoing architecture and maritime theme studies, the engineering theme study will continue for several years.

Landmarks in civil engineering derive their national significance not only from their value as reflections of a nation's technical prowess, but from their broader implications for the pace and direction of America's physical, economic and social development. Viewed in this broader perspective, advances in civil engineering influenced American's lives in many ways, including their ability to conduct business and find employment; how far from their jobs they could live; and which consumer goods they could buy.

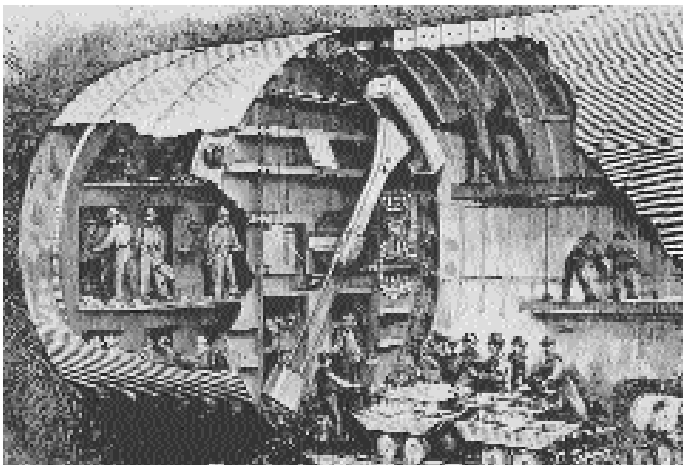
This study will examine historic properties grouped by structure type, e.g., bridges, dams, canals, and tunnels. While several related individual properties have received NHL designation in the past, advances in scholarship allow us to undertake comprehensive studies of these structure types. Each study will begin with a review of secondary sources, as well as late 19th and early 20th century popular and engineering journals.

The first structure type to be studied under this initiative will be tunnels. Tunnels are built for different needs, including transportation, mining, and water supply. Depending on the purpose of the tunnel, and the nature of the material through which it must pass, different methods of construction are required. For example, the most difficult aspect of tunneling through hard rock is the method by which the rock is cut and removed from the tunnel heading. At the same time, little problem is encountered in shoring-up the ceiling of the excavated void because the rock often supports its own weight. On the other hand, tunneling through soft or wet ground presents little difficulty in excavating, yet until safe and effective subaqueous construction methods were developed in the late 19th century, hundreds of workers were killed by flooding and cave-ins.

The tendency to focus on tunnels which are credited with being the longest or deepest will be avoided. Such properties often merely reflect the extreme application of existing construction methods. These claims also lead to confusion when a longer or deeper tunnel eclipses the earlier record holder. Instead, attention will focus on those tunnels which best represent a significant innovation in construction methods, such as the successful introduction of pneumatic drills and nitroglycerin in hard rock tunneling on the mid-19th century Hoosac Tunnel, or the first successful use of the shield method of tunneling in a compressed air work environment used to build a railroad tunnel under the St. Clair River in 1890, or the first application of scientific study to the design and construction of ventilation systems for subaqueous automobile tunnels developed for the Holland Tunnel in the 1920s.

Those properties receiving full attention must also possess high levels of historic integrity. For example, the first railroad tunnel bored through rock with compressed air drills will not be appropriate for NHL nomination if it was later widened by a modern boring machine. In such a case the tunnel would then illustrate a construction method different from the one which possessed national significance. Since such problems of historic integrity are common with historic engineering and industrial properties, there may be certain breakthroughs in technology for which there remain no associated properties possessing the levels of national significance and historic integrity required for NHL designation.

Finally, it is hoped that these theme studies will not only serve as a means of identifying properties worthy of NHL designation, but will serve a broader purpose as well. By providing a comparative analysis of the various elements of these historic resources, these theme studies will strive to assist those in the National Register programs, the state historic preservation offices, the parks, and the regional offices who are concerned about developing standards by which other potentially historic engineering resources may be evaluated.



Excavating and assembling the cast iron tunnel lining. *Scientific American,* August 9, 1890.

Robie Lange is a historian in the History Division, National Park Service, Washington Office. For additional information or suggestions concerning this ongoing NHL theme study, contact Robie at 202-343-0350.